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TITLE: ACTIVE WIRELESS DATA CHANNEL SELECT MECHANISM

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ACTIVE WIRELESS DATA CHANNEL SELECT MECHANISM

FIELD OF THE INVENTION

This invention relates generally to data transmission over digital cellular connections. In particular, this invention relates to a mechanism to actively select a wireless data channel.

BACKGROUND OF THE INVENTION

Wireless data applications, such as Voice over IP (VoIP) calls are typically supported by a wired network with Personal Computers (PCs) and dedicated equipment. VoIP calls are transmitted over high-speed wireless data channels. Some of these channels include satellite radio networks, 3G wireless networks, and Wi-Fi networks. Various other high-speed networks continue to emerge. The rates of data transmission over the different networks may vary. The cost of transmission over the various networks may vary according to factors such as bandwidth and availability. Moreover, different networks may be available in different geographic areas and may fluctuate in signal strength throughout a coverage area.

Presently, a VoIP call is transmitted on a set communication data channel. If the transmission channel becomes unavailable during the call, the call is dropped and a new connection needs to be established to continue the data communication. The user's information may be lost and the process is both cost and time consuming. Moreover, the user has no control over what channels are used to transmit data.

Accordingly, it would be desirable to have a method to actively select a wireless data channel that overcomes the above disadvantages.

SUMMARY OF THE INVENTION

One aspect of the present invention provides a method for providing a selected wireless connection between a telematics unit and a call center. The method provides a list of wireless networks with an associated ranking to the telematics unit and determines which wireless networks from the list of wireless networks are available for connection. The method also selects a first channel for a wireless network based on the determination and the associated ranking. The method also monitors the list for available networks and switches to a second channel based on a higher ranked available network.

Another aspect of the present invention provides a computer usable medium including a computer readable program for providing a selected wireless connection between a telematics unit and a call center. The computer usable medium comprises computer readable program code for providing a list of wireless networks with an associated ranking to the telematics unit and for determining which wireless networks from the list of wireless networks are available for connection. The computer usable medium also comprises computer readable program code for selecting a first channel for a wireless network based on the determination and the associated ranking. The computer usable medium further comprises computer readable program code for monitoring the list for available networks and for switching to a second channel based on a higher ranked available network.

Another aspect of the present invention provides a system for providing a selected wireless connection between a telematics unit and a call center. The system comprises means for providing a list of wireless networks with an associated ranking to the telematics unit and for determining which wireless networks from the list of wireless networks are available for connection. The system also provides means for selecting a first channel for a wireless network based on the determination and the associated ranking. The system also provides means for monitoring the list for available networks and for switching to a second channel based on a higher ranked available network.

The foregoing and other features and advantages of the invention will become further apparent from the following detailed description of the presently preferred embodiments, read in conjunction with the accompanying drawings. The detailed description and drawings are merely illustrative of the invention rather than limiting, the scope of the invention being defined by the appended claims and equivalents thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram illustrating an operating environment in accordance with one embodiment, of the present invention;

FIG. 2 is a block diagram of a mobile vehicle interface for managing communication channels and transmitting data in accordance with one embodiment, of the present invention;

FIG. 3 is a flow diagram of a method to provide a selected wireless connection between a telematics unit and a call center in accordance with one embodiment, of the present invention; and

FIG. 4 is a flow diagram of a method to provide a selected wireless connection between a telematics unit and a call center in accordance with one embodiment, of the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

FIG. 1 is an illustrative operating environment for an embodiment, of the present invention. FIG. 1 shows a mobile vehicle communication system (MVCS) **100**. Mobile vehicle communication system **100** includes mobile vehicle **110**, vehicle communication bus **112**, vehicle communications unit (VCU) **120**, one or more wireless carrier systems **140**, one or more communication networks **142**, one or more land networks **144**, one or more client, personal or user computers **150**, one or more web-hosting portals **160**, and one or more call centers **170**. In one embodiment, mobile vehicle **110** is implemented as a mobile vehicle equipped with suitable hardware and software for transmitting and receiving voice and data communications.

In an embodiment, vehicle communications unit **120** is a telematics unit that includes a digital signal processor (DSP) **122** connected to a wireless modem **124**, a global positioning system (GPS) unit **126**, an in-vehicle memory **128**, a microphone **130**, one or more speakers **132**, an embedded or in-vehicle mobile phone **134**, and a vehicle communications platform (VCP) **136**. DSP **122** is also referred to as a microcontroller, application specific integrated circuit (ASIC), microprocessor, controller, host processor, or vehicle communications processor. GPS unit **126** provides longitude and latitude coordinates of the vehicle, as well as a time stamp and a date stamp. In-vehicle mobile phone **134** is a cellular-type phone, such as, for example an analog, digital, dual-mode, dual-band, multi-mode or multi-band cellular phone. In another example, the mobile telephone system is an analog mobile telephone system operating over a predetermined band nominally at 800 MHz. The mobile telephone system is a digital mobile telephone system operating over a predetermined band nominally at 800 MHz, 900 MHz, 1900 MHz, or any suitable band capable of carrying mobile communications. Examples of such digital mobile telephone systems include code division multiple access (CDMA) (e.g. IS-95), Groupe Special Mobile (GSM), and time division multiple access (TDMA).

DSP **122** executes various computer programs that control programming and operational modes of electronic and mechanical systems within mobile vehicle **110**. DSP **122** controls communications between telematics unit **120**, wireless carrier system **140**, and call center **170**. In one embodiment, the DSP **122** manages communication channels and transmission of data through the VCP **136**. In one embodiment, a voice-recognition application is installed in DSP **122** to translate human voice input through microphone **130** into digital signals. DSP **122** generates and accepts digital signals transmitted between telematics unit **120** and a vehicle communication bus **112** that is connected to various electronic modules in the vehicle **110**. In one embodiment, the digital signals activate the programming mode and operation modes, as well as provide for data transfers. In this embodiment, signals from DSP **122** are translated into voice messages and sent out through speaker **132**.

Mobile vehicle **110**, via a vehicle communication bus **112**, sends signals to various units of equipment and systems within mobile vehicle **110** to perform various functions such as unlocking a door, opening the trunk, setting personal comfort settings, and calling from telematics unit **120**. In facilitating interactions among the various communication and electronic modules, vehicle communication bus **112** utilizes bus interfaces such as controller-area network (CAN), International Organization for Standardization (ISO) Standard 9141, ISO Standard 11898 for high-speed applications, ISO Standard 11519 for lower speed applications, and Society of Automotive Engineers (SAE) Standard J1850 for high speed and lower speed applications.

Mobile vehicle **110**, via telematics unit **120**, sends and receives radio transmissions from wireless carrier system **140**. Mobile vehicle **110** may be in communication with one or more wireless carrier systems **140**. Wireless carrier system **140** is implemented as any suitable system for transmitting a signal from mobile vehicle **110** to communication network **142**. Wireless carrier system **140** incorporates any type of telecommunications in which electromagnetic waves carry signal over part of or the entire communication path. In one embodiment,

wireless carrier system **140** transmits analog audio and/or video signals. In an example, wireless carrier system **140** transmits analog audio and/or video signals such as those sent from AM and FM radio stations and transmitters, or digital audio signals in the S band (approved for use in the U.S.) and L band (used in Europe and Canada). In one embodiment, wireless carrier system **140** is a satellite broadcast system broadcasting over a spectrum in the "S" band (2.3 GHz) that has been allocated by the U.S. Federal Communications Commission (FCC) for nationwide broadcasting of satellite-based Digital Audio Radio Service (DARS). In another example, wireless carrier system **140** includes a short message service, modeled after established protocols such as IS-637 SMS standards, IS-136 air interface standards for SMS, and GSM 03.40 and 09.02 standards. Similar to paging, an SMS communication could be broadcast to a number of regional recipients. In another example, the carrier uses services compliant with other standards, such as, for example, IEEE 802.11 compliant systems, Bluetooth systems, and the like.

Communication network **142** includes services from one or more mobile telephone switching offices and wireless networks. Communication network **142** connects wireless carrier system **140** to land network **144**. Communication network **142** is implemented as any suitable system or collection of systems for connecting wireless carrier system **140** to mobile vehicle **110** and land network **144**.

Land network **144** is a public-switched telephone network (PSTN). Mobile vehicle **110** may be in communication with one or more land networks **144**. In one embodiment, land network **144** is implemented as an Internet protocol (IP) network. In other embodiments, land network **144** is implemented as a wired network, an optical network, a fiber network, another wireless network, or any combination thereof. Land network **144** is connected to one or more landline telephones. Land network **144** connects communication network **142** to user

computer **150**, web-hosting portal **160**, and call center **170**. Communication network **142** and land network **144** connects wireless carrier system **140** to web-hosting portal **160** and call center **170**.

Client, personal or user computer **150** includes a computer usable medium to execute Internet browser and Internet-access computer programs for sending and receiving data over land network **144** and optionally, wired or wireless communication networks **142** to web-hosting portal **160**. Personal or user computer **150** sends data to web-hosting portal through a web-page interface using communication standards such as hypertext transport protocol (HTTP), and transport-control protocol Internet protocol (TCP/IP). In one embodiment, the data includes vehicle data such as user preferences and selections and operational modes of electronic and mechanical systems within mobile vehicle **110**. In operation, a driver utilizes user computer **150** to initiate setting or re-setting of user-preferences for mobile vehicle **110**. Various vehicle data from client-side software is transmitted to server-side software of web-hosting portal **160**. Other vehicle data is stored at web-hosting portal **160**.

Web-hosting portal **160** includes one or more data modems **162**, one or more web servers **164**, one or more databases **166**, and a network **168**. Web-hosting portal **160** is connected, in one embodiment, directly by wire to call center **170**, or connected by phone lines to land network **144**, which is connected to call center **170**. Web-hosting portal **160** is connected to land network **144** by one or more data modems **162**. Land network **144** sends digital data to and from modem **162**, and this data is subsequently transferred to web server **164**. In one embodiment, modem **162** resides inside web server **164**. Land network **144** transmits data communications between web-hosting portal **160** and call center **170**.

Web server **164** receives data from user computer **150** via land network **144**. In alternative embodiments, user computer **150** includes a wireless modem to send vehicle data to web-hosting portal **160** through a wireless communication network **142** and a land network **144**. Data is received by modem **162** and sent to one or more web servers **164**. In one embodiment, web server **164** is implemented as any suitable hardware and software capable of providing web services to transmit and receive vehicle data from user computer **150** to telematics unit **120** in mobile vehicle **110**. Web server **164** sends to or receives data transmissions from one or more databases **166** via network **168**. Web server **164** includes computer applications and files for managing vehicle data and generating targeted data.

In one embodiment, one or more web servers **164** are networked via network **168** to distribute vehicle data among its network components such as database **166**. In an example, database **166** is a part of or a separate computer from web server **164**. Web server **164** sends data transmissions to call center **170** via modem **162**, and through land network **144**.

Call center **170** is a location where many calls are received and serviced at the same time, or where many calls are sent at the same time. In one embodiment, the call center is a telematics call center, facilitating communications to and from telematics unit **120** in mobile vehicle **110**. In an example, the call center is a voice call center, providing verbal communications between an advisor in the call center and a subscriber in a mobile vehicle. In another example, the call center contains each of these functions. In other embodiments, call center **170** and web-hosting portal **160** are located in the same or different facilities.

Call center **170** contains one or more voice and data switches **172**, one or more communication services managers **174**, one or more communication services databases **176**, one or more communication services advisors **178**, and one or more network **180**.

Switch **172** of call center **170** connects to land network **144**. Switch **172** transmits voice or data transmissions from call center **170**, and receives voice or data transmissions from telematics unit **120** in mobile vehicle **110** through wireless carrier system **140**, communication network **142**, and land network **144**. Switch **172** receives data transmissions from and sends data transmissions to one or more web-hosting portals **160**. Switch **172** receives data transmissions from or sends data transmissions to one or more communication services managers **174** via one or more networks **180**.

Communication services manager **174** is any suitable hardware and software capable of providing communication services to telematics unit **120** in mobile vehicle **110**. Communication services manager **174** sends to or receives data transmissions from one or more communication services databases **176** via network **180**. Communication services manager **174** sends to or receives data transmissions from one or more communication services advisors **178** network **180**. Communication services database **176** sends to or receives data transmissions from communication services advisor **178** via network **180**. Communication services advisor **178** receives from or sends to switch **172** voice or data transmissions.

Communication services manager **174** facilitates one or more services, such as, but not limited to, enrollment services, navigation assistance, directory assistance, roadside assistance, business or residential assistance, information services assistance, emergency assistance, and communications assistance and vehicle data management services. Communication services manager **174** receives service requests for services from a user via user computer **150**, web-hosting portal **160**, and land network **144**. Communication services manager **174** transmits and receives vehicle data to telematics unit **120** in mobile vehicle **110** through wireless carrier system **140**, communication network **142**, land network **144**, voice and data switch **172**, and network **180**. Communication services

manager **174** stores or retrieves vehicle data and information from communication services database **176**. Communication services manager **174** may provide requested information to communication services advisor **178**.

In one embodiment, communication services advisor **178** is a real advisor. In another embodiment, communication services advisor **178** is implemented as a virtual advisor. In an example, a real advisor is a human being at service provider service center in verbal communication with service subscriber in mobile vehicle **110** via telematics unit **120**. In another example, a virtual advisor is implemented as a synthesized voice interface responding to requests from telematics unit **120** in mobile vehicle **110**.

Communication services advisor **178** provides services to telematics unit **120** in mobile vehicle **110**. Services provided by communication services advisor **178** include enrollment services, navigation assistance, real-time traffic advisories, directory assistance, roadside assistance, business or residential assistance, information services assistance, emergency assistance, and communications assistance. Communication services advisor **178** communicates with telematics unit **120** in mobile vehicle **110** through wireless carrier system **140**, communication network **142**, and land network **144** using voice transmissions, or through communication services manager **174** and switch **172** using data transmissions. Switch **172** selects between voice transmissions and data transmissions.

Mobile vehicle **110** initiates service requests to call center **170** by sending a voice or digital-signal command to telematics unit **120** which in turn, sends an instructional signal or a voice call through wireless modem **124**, wireless carrier system **140**, communication network **142**, and land network **144** to call center **170**. In another embodiment, the service request is for a vehicle data upload. In yet another embodiment, the mobile vehicle **110** receives a request from call center **170** to send various vehicle data from mobile vehicle **110** through telematics unit **120**, wireless modem **124**, wireless carrier system **140**, communication network **142**, and land network **144** to call center **170**.

FIG. 2 is a block diagram of one embodiment, of a mobile vehicle interface for managing communication channels and transmitting data.

FIG. 2 shows a mobile vehicle interface for managing data transmission **200**. In one embodiment, DSP **122** is connected to and manages data transmission through VCP **136**. A user accesses VCP **136** remotely or directly while inside the vehicle **110**. VCP **136** contains a number of modules for managing vehicle data transmission.

A flash memory module **210** is located, in one embodiment, on the VCP **136**. In one embodiment, flash memory **210** is programmed to store necessary information to efficiently manage communications. Flash memory **210** receives relayed information from the wireless carrier system **140**. Flash memory **210** is in communication with a preference table **215** that ranks available data transmission channels. Data transmission channels are located on the wireless carrier systems **140** and may include, but are not limited to, any carrier system **140** as described above in FIG. 1. In one embodiment, a user can determine his/her preferences for the data channels by accessing a website through user computer **150**, a mobile device such as a laptop computer, a personal digital advisor (PDA), or a telematics unit interface inside of a mobile vehicle **110**. In another embodiment, preference table **215** is continually updated from a remote node or call center **170**.

In another embodiment, the flash memory module **210** is non-volatile memory, such as a disk. In such embodiments, the non-volatile memory functions identically as the flash memory described above.

Preference table **215** provides a ranking system for data transmission channels. In one embodiment, the preference table **215** is remotely accessed and programmed by a user. A user determines a ranking for available data channels based on personal preferences. In one embodiment, user preferences include cost of a data channel, availability of a data channel within a specific area, speed of data transmission on a data channel, reliability of a data channel, security of a data channel, and signal strength of a data channel in a specific area.

Each data channel has certain usability characteristics such as cost, availability, speed of transmission, reliability, security, and signal strength. The cost of each data channel varies based on area, amount of coverage, and various other factors. Availability of data channels within a specific area also varies based on service providers and area of coverage. Speed of data transmission varies based upon each channel's bandwidth and speed capability. The reliability of each data channel may also vary based upon geography and availability of signal reception. The security of each data channel may be dependent on various security protocols guiding each channel as is well known in the art. The signal strength of data channels in specific areas also varies due to distance from a wireless network, geographical conditions that impact reception and transmission, and geographical or architectural barriers such as mountains or tunnels. In one embodiment, the above factors are collected, evaluated, and presented to a user by a service provider, a call center, or a combination of both.

The flash memory **210** also stores a mechanism **220** to actively select wireless data channels. Mechanism **220** provides a selected wireless connection between a telematics unit and a call center. The mechanism **220** integrates user rankings of the data channels on preference table **215** and directs switching of data channels used for data transmission. The method of the wireless data channel selection mechanism **220** is described further in FIG. 4.

In one embodiment, the wireless data channel selection mechanism **220** is in communication with a satellite radio interface **230** as well as other interfaces. Satellite radio interface **230** receives a satellite signal from any number of satellite providers. In one embodiment, such satellite signals comprise GPS satellite and XM satellite radio signals. In one embodiment, satellite radio interface **230** determines availability of a satellite data channel, signal strength of a satellite signal, security of the satellite channel, and fluctuations of the signal over time. The satellite radio interface **230** passes information and receives commands from the wireless data channel selection mechanism **220**.

In another embodiment, wireless channel selection mechanism **220** is in communication with a Wireless Fidelity (Wi-Fi) interface **240** as well as other interfaces. The Wi-Fi interface **240** is in communication with an 802.11 connection to a Wi-Fi access point (hotspot). In one embodiment, the carrier uses services compliant with standards such as IEEE 802.11 compliant systems, Bluetooth systems, and the like. The Wi-Fi hotspot may contain a Wi-Fi access device, firewalls, and other systems that facilitate access to a secure data connection. In one embodiment, the Wi-Fi interface **240** determines availability of a Wi-Fi channel, security of the channel, signal strength of the Wi-Fi channel, and fluctuations of the signal over time. The Wi-Fi interface **240** passes information and receives commands from the voice channel selection mechanism **220**.

In yet another embodiment, wireless data channel selection mechanism **220** is in communication with a cellular interface **250** as well as other interfaces. Cellular interface **250** is in communication with a digital or analog wireless carrier network. In one embodiment, cellular interface **250** is in communication with a 3G wireless network. Cellular interface **250** determines availability of a cellular data channel, signal strength of a cellular signal, security of the cellular channel, and fluctuations of the signal over time. The cellular interface **250** passes information and receives commands from the wireless data channel selection mechanism **220**.

In yet another embodiment, wireless data channel selection mechanism **220** is also in communication with a digital computing device interface **260** via the VCP **136**. Digital computing device interface **260** is in communication with any number of digital computing devices **265**. In one embodiment, a digital computing device **265** is in remote communication with the digital computer device interface **260** via a remote connection. In another embodiment, the digital computer devices are in direct communication with digital computer interface **260**. The directly connected digital computer devices **265** can be plugged into the digital computer device interface **260** on the telematics unit **120**. Digital computer devices **265** comprise any computing or adaptable digital device that can transmit or store data remotely to the telematics unit, such as a laptop computer or a PDA. The VCP **136** thus serves as an access point for digital computer devices **265**.

Other modules **270** are in communication with wireless channel selection mechanism **220**. In one embodiment, modules **270** include any number of software programs and interfaces available on the telematics unit.

In one embodiment, the mechanism **220** is programmed directly onto the vehicle telematics unit **120**, or downloaded to it remotely. In another embodiment, the mechanism **220** is programmed directly or remotely onto a mobile device such as a laptop, PDA, or mobile telephone that is in communication with a number of wireless carriers **140**.

FIG. 3 is a flow diagram of one embodiment, of a method to provide a selected wireless connection between a telematics unit and a call center in accordance with one embodiment, of the present invention.

FIG.3 describes an exemplary method **300** of actively selecting a wireless data channel. The method begins at block **310**.

Method **300** scans for available data channels from a list of existing channels on wireless networks **140** at block **320**. In one embodiment, a channel signal strength threshold determines availability of a data channel. If the data channel is at, or above, the designated signal strength, then the data channel is determined to be an available data channel. Available data transmission channels are then compared with a ranking of data channels. In one embodiment, a preference table **215** provides the ranking of data channels.

The most preferred channel is selected from the available data channels at block **330**. Method **300** thus selects a first channel. In one embodiment, a connection is established between the telematics unit **120** and a remote node when a first channel is selected.

Existing networks are then monitored for available channels at block **340**. In one embodiment, monitoring the channels involves scanning all existing data channels within a predetermined time period.

If a new channel becomes available that is ranked higher than the first selected channel, then the method **300** switches to the higher ranked channel at block **350**. Method **300** thus selects a second channel. The wireless carrier network **140** being used is switched to the more preferred channel, and the data being transmitted is switched to the new network without losing or dropping the previously transmitted data. The telematics unit thus remains in communication with the remote node where data is being transferred. Similarly, if the channel being used for data transmission becomes unavailable then the method **300** switches the data transmission to the next highest ranked and available data channel.

In one embodiment, the method **300** is optimized for a data packet connection between a telematics unit and a call center. Data packet connection optimization allows uninterrupted transmission of data between the telematics unit and the call center. In another embodiment, the method is optimized generally for any connection over a digital wireless network. The term 'digital' may be understood to encompass all forms of communication that are not in analog format.

The method **300** stops at block **360**.

FIG. 4 is a flow diagram of a method to provide a selected wireless connection between a telematics unit and a call center, in accordance with another embodiment, of the present invention.

FIG. 4 describes an exemplary method **400** of using the wireless data channel selection mechanism **220**. The method **400** starts at block **404**. The telematics unit **120** is activated at block **408** by a user in the mobile vehicle **110** or by a remote node. The telematics unit **120** then initiates a request for a data transfer at block **410**. A type of data transfer is then determined at block **420**. In one embodiment, the format and amount of data to be transferred is determined to optimize transmission.

The VCP **136** then accesses the flash memory **210** and initiates the wireless data channel selection mechanism **220** at block **430**. In one embodiment, a channel preference table **215** is accessed at block **438** to determine a ranking for available data channels.

The preference table **215** may be accessed and modified remotely from a call center **170** or by a user at block **434**. In one embodiment, the user changes their preferences through a user computer **150** by accessing an Internet website. In another embodiment, the user accesses and modifies the table **215** directly through an interface on the VCP **136**.

The telematics unit **120** scans for available data channels from a list of existing channels on wireless networks **140** at block **440**. In one embodiment, a channel signal strength threshold determines availability of a data channel. If the data channel is at or above the designated signal strength then it is determined to be an available data channel. Available data transmission channels are then compared with the channel preference table **215** and the preferred data channel is selected from the available data channels. In one embodiment, the method **400** first searches for availability of a Wi-Fi channel as Wi-Fi networks are often free and may therefore be ranked as the highest data channel.

Availability of data channels is further determined by any one of the factors described above in FIG. 2. These factors comprise cost of a data channel, availability of a data channel within a specific area, speed of data transmission on a data channel, reliability of a data channel, security of a data channel, and signal strength of a data channel in a specific area.

In one embodiment, data transmission begins at block **440** as soon as a preferred available data channel is detected. In another embodiment, the method **400** waits until the user is informed of the data channel being used at block **450** to begin data transmission.

In one embodiment, the user is informed of the channel being used for data transfer at block **450**. In one embodiment, the channel in use for data transmission is indicated on a telematics unit display. In another embodiment, the user is informed of the data channel being used by a voice prompt played through the speakers of the telematics unit. If data transmission has not started at block **440** then data transmission begins at block **450**, after the user has been informed of the channel being used for data transmission.

Existing networks are then monitored for available channels at block **460**. Each data channel has certain usability characteristics such as cost, availability, speed of data transmission, reliability, security, and signal strength within an area. In one embodiment, monitoring the channels involves scanning all available data channels to determine their usability characteristics. In one embodiment, the method scans for available data channels every 100 ms, effectively scanning in real time. In a second embodiment, the method scans for available data channels every 1 to 3 seconds.

If a new channel becomes available that is ranked higher by a user than the channel being used for data transmission, then the mechanism **220** manages a switch to the higher ranked channel at block **470**. The wireless carrier network **140** being used is switched to the more preferred channel, and the data being transmitted is switched to the new network without losing or dropping the previously transmitted data. The telematics unit thus remains in communication with the remote node where data is being transferred. Similarly, if the channel being used for data transmission becomes unavailable then the mechanism **220** switches the data transmission to the next highest ranked and available data channel.

In one embodiment, a default data channel is designated. The default data channel is used to transmit data if no other higher ranked channels are available, or if a ranking for data channels is not available. In one embodiment, a default data channel comprises a digital mobile telephone channel. In another embodiment, a default data channel comprises a satellite data channel.

After switching channels at block **470**, existing data channels continue to be monitored for available data channels at block **480**. The method **400** continues to check for an available channel that is higher ranked to become available or for a channel being used for data transmission to become unavailable at block **485**. If a new channel does become available, or a channel being used for transmission becomes unavailable then the mechanism **220** again

manages the switch of the data channel used for data transmission at block **470**. In one embodiment, the user is informed every time the transmission data channel is switched to a new channel. Following the switch at block **470** the existing data channels continue to be monitored at block **480** for availability.

Data transmission finishes at block **490**. The transmission may be ended by a user, a remote node, or automatically by means of all of the data being transmitted. The telematics unit **120** then disconnects from the wireless network **140** and signals to the mechanism **220** that data transmission has been ended. The mechanism **220** is then turned off.

In one embodiment, the method **400** is optimized for a data packet connection between a telematics unit and a call center. Data packet connection optimization allows uninterrupted transmission of data between the telematics unit and the call center. In another embodiment, the method is optimized generally for any connection over a digital wireless network. The term 'digital' may be understood to encompass all forms of communication that are not in analog format.

The method **400** stops at block **495**.

While the embodiments of the invention disclosed herein are presently considered to be preferred, various changes and modifications can be made without departing from the spirit and scope of the invention. The scope of the invention is indicated in the appended claims, and all changes that come within the meaning and range of equivalents are intended to be embraced therein.